Satellite Observations of the Southern California Bight: Surface Circulation, Oil Seepage, Storm Water Runoff and Biological Implications

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This synergistic, interdisciplinary study uses ERS-1/2 and RADARSAT Synthetic Aperture Radar (SAR) imagery, complemented by near-coincident satellite (SST: AVHRR, ATSR; Ocean Color: OCTS, SeaWiFS, MODIS) and field (via ships, moorings and drifters) data to describe small-scale coastal ocean phenomena in the Southern California Bight (SCB), particularly the Santa Barbara Channel and Santa Monica Bay/Basin regions. Though part of the California Current System, SCB circulation patterns are more complex than elsewhere off the U.S. pacific coast, due in part to temporally variable winds, eight nearshore islands, coastal promontories, narrow channels, and submarine canyons, basins and ridges.

We describe here the extensive appearance of small (from 1-50 kilometers in diameter) coastal ocean eddies in the SCB. Eddies are small (mostly < 20 km diameter), predominantly cyclonic, and possibly seasonal in their distribution. They appear to result from a number of mechanisms, including topographic forcing and current instabilities, and are smaller in size and more abundant than previously reported. They engender significant phytoplankton patchiness in the SCB, and likely have important ramifications for primary productivity, larval transport and recruitment, and the dispersal of pollutants. These pollutants result from both natural and anthropogenic sources. We examine the distribution and persistence of natural hydrocarbon seepage in the Santa Barbara Channel and Santa Monica Bay, likewise the fate of pollutant laden storm water runoff from the urban Los Angeles Basin, and subsequent algal bloom events.

ENVISAT (ASAR, AATSR, MERIS) data will be used to extend these ongoing analyses, providing the necessary spatial, temporal and spectral resolution data required to resolve these small-scale coastal ocean features in the SCB. It will also enable us to extend our analyses to the adjacent central California coastal region to the north, allowing for both interregional and interannual comparative studies.